What is claimed is:

1. A viewing system comprising a spatial light modulator and a light guide bundle having a proximal end and a distal end, wherein spatial light modulator is optically connected to the proximal end of the light guide bundle in a same conjugate image plane as the proximal end such that the spatial light modulator controls the location of light impinging on the proximal end.

2. The viewing system of claim 1 wherein the viewing system comprises an endoscope.

3. The viewing system of claim 2 wherein the light guide bundle comprises at least 100 light guides and the endoscope is a confocal microscopy endoscope.

4. The viewing system of claim 1 wherein the spatial light modulator is operably connected to a controller comprising computer-implemented programming able to set to an on-state pixels of the spatial light modulator corresponding to cores of corresponding light guides in the light guide bundle to provide on-pixels and able to set to an off-state pixels corresponding to inter-core areas of the light guide bundle to provide off-pixels.

5. The viewing system of claim 4 wherein a plurality of selected groups of the on-pixels are in the on-state, the selected groups being spaced apart such that light emanating from the distal end of a first light guide corresponding to a first selected group of on-pixels does not substantially interfere with light emanating from the distal end of a second light guide corresponding to a second selected group of on-pixels, and substantially all other pixels of the spatial light modulator are in the off-state.

6. The viewing system of claim 4 wherein at least 3 different pixels of the spatial light modulator correspond to each core of substantially all of the corresponding light guides.

7. The viewing system of claim 4 or 5 wherein the viewing system further comprises a pixelated detector optically connected to receive light emanating from the proximal end of the light guide bundle and the controller further comprises computer-implemented programming that distinguishes between light emanating from the light guides corresponding to on-pixels of the spatial light modulator and light emanating from other light guides.

8. The viewing system of claim 7 wherein the computer-implemented programming additionally ignores light emanating from the other light guides.

9. The viewing system of claim 7 wherein the controller further comprises computer-implemented programming that detects light emanating from the other light guides to provide out-of-focus data and the programming incorporates the out-of-focus data with the light emanating from the light guides corresponding to the on-pixels to provide an enhanced image.

10. The viewing system of claim 9 wherein the controller fits the out-of-focus data and the light emanating from the light guides corresponding to the on-pixels using a 2D Gaussian distribution.

11. The viewing system of claim 1 wherein the viewing system is a single-pass viewing system, and the viewing system further comprises a light source optically connected to the proximal end of the light guide bundle and the spatial light modulator is optically connected between the light source and the proximal end of the light guide bundle.

12. The viewing system of claim 1 wherein the viewing system is a double-pass viewing system, and the viewing system further comprises a light source and a detector that are both optically connected to the proximal end of the light guide bundle,

and the spatial light modulator is optically connected between a) each of the light source and the detector, and b) the proximal end of the light guide bundle.

13. The viewing system of claim 11 or 12 wherein the controller further comprises computer-implemented programming that maps pixels of the spatial light modulator to corresponding cores of corresponding light guides in the light guide bundle to provide a map comprising corresponding pixels and non-corresponding pixels.

14. The viewing system of claim 13 wherein the viewing system further comprises a scanner that controls the location of light transmitted to the spatial light modulator and on to the proximal end of the light guide bundle, and the controller further comprises computer-implemented programming that directs the scanner to scan the spatial light modulator and simultaneously sets at least one of the corresponding pixels to an on-state and sets other pixels of the spatial light modulator to an off-state, thereby causing light from the light source to be transmitted substantially only to the cores of corresponding light guides.

15. The viewing system of claim 13 wherein the light source is optically connected to the spatial light modulator such that the light source illuminates a substantial portion of the pixels of the spatial light modulator, and the controller further comprises computer-implemented programming that sets selected corresponding pixels to an on-state and sets other pixels of the spatial light modulator to an off-state, thereby causing light from the light source to be transmitted substantially only to the cores of the light guides corresponding to the corresponding pixels.

16. The viewing system of claim 15 wherein the controller further comprises computer-implemented programming that selects the selected corresponding pixels that are set to an on-state such that light emanating from the distal end of a first light guide corresponding to a first selected corresponding pixel does not substantially interfere

with light emanating from the distal end of a second light guide corresponding to a second selected corresponding pixel, and the selected corresponding pixels that are set to an on-state are varied over time such that substantially all of the light guides in the light guide bundle are illuminated.

17. A flexible endoscope system providing confocal microscopy of a target tissue, the system comprising an endoscope comprising a light guide bundle comprising at least 100 light guides and having a proximal end and a distal end, the system further comprising a spatial light modulator that is optically connected to the proximal end of the light guide bundle in a same conjugate image plane as the proximal end such that the spatial light modulator controls the location of light impinging on the proximal end, and a controller comprising computer-implemented programming that is operably connected to the spatial light modulator and that is able to set to an on-state groups of pixels of the spatial light modulator corresponding to cores of corresponding light guides in the light guide bundle to provide groups of on-pixels and able to set to an off-state pixels corresponding to inter-core areas of the light guide bundle to provide off-pixels.

18. The flexible endoscope system of claim 17 wherein a plurality of selected groups of the on-pixels are in the on-state, the selected groups being spaced apart such that light emanating from the distal end of a first light guide corresponding to a first selected group of on-pixels does not substantially interfere with light emanating from the distal end of a second light guide corresponding to a second selected group of on-pixels, and other pixels of the spatial light modulator are in the off-state.

19. The flexible endoscope system of claim 18 wherein the endoscope further comprises a pixelated detector optically connected to receive light emanating from the proximal end of the light guide bundle and the controller further comprises computer-implemented programming that distinguishes between light emanating from

the light guides corresponding to on-pixels of the spatial light modulator and light emanating from other light guides.

20 The flexible endoscope system of claim 19 wherein the computer-implemented programming additionally ignores light emanating from the other light guides.

21. The flexible endoscope system of claim 19 wherein the controller further comprises computer-implemented programming that detects light emanating from the other light guides to provide out-of-focus data and the programming incorporates the out-of-focus data with the light emanating from the light guides corresponding to the on-pixels to provide an enhanced image.

22. A method of making an viewing system comprising:

a) providing a spatial light modulator;

b) providing a light guide bundle having a proximal end and a distal end; and,

c) placing the spatial light modulator in optical connection to the proximal end of the light guide bundle in a same conjugate image plane as the proximal end such that the spatial light modulator controls the location of light impinging on the proximal end.

23. The method of claim 22 wherein the method further comprises operably connecting the spatial light modulator to a controller comprising computer-implemented programming able to set to an on-state pixels of the spatial light modulator corresponding to cores of corresponding light guides in the light guide bundle to provide on-pixels and able to set to an off-state pixels corresponding to inter-core areas of the light guide bundle to provide off-pixels.

24. The method of claim 22 wherein the method further comprises optically connecting a pixelated detector to the system to receive light emanating from the proximal end of the light guide bundle and further providing the controller with computer-implemented programming that distinguishes between light emanating from the light guides corresponding to on-pixels of the spatial light modulator and light emanating from other light guides.

25. The method of claim 24 wherein the method is directed to making a single-pass viewing system, and the method further comprises providing a light source optically connected to the proximal end of the light guide bundle and placing the spatial light modulator in optical connection between the light source and the proximal end of the light guide bundle and not in optical connection between the light source and the pixelated detector.

26. The method of claim 24 wherein the method is directed to making a double-pass viewing system, and the method further comprises providing a light source optically connected to the proximal end of the light guide bundle and placing the spatial light modulator in optical connection between a) the light source and the pixelated detector, and b) the proximal end of the light guide bundle.

27. The method of claim 25 or 26 wherein the method further comprises providing a scanner that controls the location of light transmitted to the spatial light modulator and on to the proximal end of the light guide bundle, and further providing the controller with computer-implemented programming that directs the scanner to scan the spatial light modulator and simultaneously sets at least one of the corresponding pixels to an on-state and sets other pixels of the spatial light modulator to an off-state to transmit light from the light source substantially only to the cores of corresponding light guides.

28. The method of claim 25 or 26 wherein the method further comprises optically connecting the light source to the spatial light modulator such that the light source illuminates a substantial portion of the pixels of the spatial light modulator, and further providing the controller with computer-implemented programming that sets selected corresponding pixels to an on-state and sets other pixels of the spatial light modulator to an off-state to transmit light from the light source substantially only to the cores of the light guides corresponding to the corresponding pixels.

29. A method of making a flexible endoscope system comprising:

a) providing a spatial light modulator;

b) providing a light guide bundle comprising at least 100 light guides having a proximal end and a distal end, at least the distal end of the light guide bundle disposed within an endoscope;

c) placing the spatial light modulator in optical connection to the proximal end of the light guide bundle in a same conjugate image plane as the proximal end such that the spatial light modulator controls the location of light impinging on the proximal end; and,

d) operably connecting a controller comprising computer-implemented programming to the spatial light modulator wherein the controller is able to set to an on-state groups of pixels of the spatial light modulator corresponding to cores of corresponding light guides in the light guide bundle to provide groups of on-pixels and able to set to an off-state pixels corresponding to inter-core areas of the light guide bundle to provide off-pixels.

30. The method of claim 29 wherein the method further comprises optically connecting a pixelated detector to the system to receive light emanating from the proximal end of the light guide bundle and further providing the controller with computer-implemented programming that distinguishes between light emanating from the light guides corresponding to on-pixels of the spatial light modulator and light emanating from other light guides.

31. A method of illuminating a target comprising:

a) transmitting light from a light source to a proximal end of a light guide bundle via a spatial light modulator wherein the spatial light modulator transmits the light substantially only to cores of light guides in the light guide bundle;

b) transmitting the light from the proximal end of the light guide bundle to a distal end of the light guide bundle and emitting the light from the distal end of the light guide bundle; and,

c) illuminating the target with the light emitted from the distal end of the light guide bundle.

32. The method of claim 31 wherein the method comprises scanning a light beam across the spatial light modulator and simultaneously setting at least one pixel of the spatial light modulator that corresponds to a core of one of the light guides to an on-state to provide at least one on-pixel and setting other pixels of the spatial light modulator to an off-state, whereby the light beam is transmitted substantially only to the core of the light guide when the light beam contacts the on-pixel and the light beam is not transmitted to inter-core areas of the light guide bundle or to light guides adjacent to the light guide.

33. The method of claim 32 wherein the light beam is a laser beam.

34. The method of claim 32 wherein the method comprises scanning the light beam across substantially all pixels that are set to an on-state over time such that substantially all of the light guides in the light guide bundle are illuminated, thereby illuminating substantially all of the target within a field of view of the light guide bundle without moving the light guide bundle.

35. The method of claim 31 wherein the method comprises optically connecting the light source to the spatial light modulator such that the light source

illuminates a substantial portion of the pixels of the spatial light modulator, and setting selected corresponding pixels to an on-state and setting other pixels of the spatial light modulator to an off-state such that light from the light source is transmitted substantially only to the cores of the light guides corresponding to the corresponding pixels.

36. The method of claim 35 wherein the method comprises varying the selected corresponding pixels that are set to an on-state over time such that substantially all of the light guides in the light guide bundle are illuminated, thereby illuminating substantially all of the target within a field of view of the light guide bundle without moving the light guide bundle.

37. The method of claim 35 or 36 wherein the method comprises selecting the selected corresponding pixels that are set to an on-state such that light emanating from the distal end of a first light guide corresponding to a first selected corresponding pixel does not substantially interfere with light emanating from the distal end of a second light guide corresponding to a second selected corresponding pixel.

38. A method of obtaining an image of a target comprising:

a) transmitting light from a light source via a spatial light modulator to a light guide bundle, then emitting the light from a distal end of the light guide bundle to illuminate the target and thereby cause light to emanate from the target to provide emanating light;

b) collecting the emanating light that contacts the distal end of the light guide bundle; and

c) transmitting the emanating light via the light guide bundle to a detector to provide an image of the target at the detector.

39. The method of claim 38 wherein the detector comprises an eyepiece ocular.

40. The method of claim 38 wherein the detector comprises a pixelated detector.

41. The method of claim 40 wherein the method comprises setting to an on-state pixels of the spatial light modulator that correspond to cores of corresponding light guides in the light guide bundle to provide on-pixels and setting to an off-state pixels corresponding to inter-core areas of the light guide bundle to provide off-pixels.

42. The method of claim 41 wherein the method comprises setting a plurality of selected groups of the on-pixels to an on-state wherein the selected groups are spaced apart such that light emanating from the distal end of a first light guide corresponding to a first selected group of on-pixels does not substantially interfere in the target with light emanating from the distal end of at least one second light guide corresponding to at least one second selected group of on-pixels, and substantially all other pixels of the spatial light modulator are in the off-state to provide other light guides.

43. The method of claim 41 wherein the method further comprises ignoring light emanating from the other light guides.

44. The method of claim 42 wherein the method further comprises evaluating the light emanating from the other light guides to provide out-of-focus data and the incorporating the out-of-focus data with the light emanating from the light guides corresponding to the on-pixels to provide an enhanced image.

45. The method of claim 38 wherein the method comprises transmitting the light past the spatial light modulator only in an illumination light path to provide a single-pass viewing system such that the spatial light modulator acts as an illumination mask such that illumination light is transmitted substantially only to light guide cores of light guides that correspond to on-pixels of the spatial light modulator.

46. The method of claim 38 wherein the method comprises transmitting the light past the spatial light modulator in both an illumination light path and a detection light path to provide a double-pass viewing system, such that the spatial light modulator acts as an illumination mask such that illumination light is transmitted substantially only to corresponding light guides and as a detection mask that substantially prevents light from light guides other than corresponding light guides from reaching the detector.

47. The method of claim 42 wherein the method comprises mapping pixels of the spatial light modulator to corresponding cores of corresponding light guides in the light guide bundle to provide a map comprising corresponding pixels and non-corresponding pixels.